



THERAPEUTIC EFFECTS OF *ELEPHANTOPUS SCABER* LINN.: A REVIEW

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ABSTRACT:

Different types of medicinal plant species are referred to as *gojihva* in India. One of them that is frequently used in the name of *gojihva* is *Elephantopus scaber* Linn (*E. scaber*), which belongs to the Asteraceae family. The herb *gojihva* is used to treat a variety of conditions, including those that affect the respiratory system, the heart, blood clotting issues, fever, and wound healing. *Gojihva* possess *kashaya- tikta rasa, laghu guna, sheeta virya* and *madhura vipaka* with *kapha-vata* pacifying properties. Numerous studies have been conducted on the *Gojihva* to determine its efficacy in treating various diseases, but besides that, it also possesses some intriguing pharmacological features, like anti-cancerous activity, anti-microbial, anti-inflammatory, hepatoprotective, antioxidant properties etc. *E. scaber* plants are rare and difficult to come by as a result of their subpar cultivation and propagation practices. As a result, we have tried to compile all therapeutic effects of *E. scaber* from diverse sources. This article's goal is to consolidate all of the ethnobotanical and medicinal uses of *E. scaber* in order to facilitate future study and therapeutic application of this plant.

Keywords: *Gojihva, Elephantous scaber*, anti-cancerous, antihistaminic, antioxidants.

INTRODUCTION

The herb *gojihva* is used to treat a number of illnesses, which are associated to the

Plant identification



Figure 1 Image of *E.scaber*

E. scaber Linn is a terrestrial plant of Asteraceae family distributed abundantly all over India mainly in Bangal and east India. Its rootstock is short, erect, stiff, perennial herb, up to about 60 cm in height. Leaves mostly radical in basal rosette and a few are cauline, finely dentate, obovate oblong. Capitula numerous homogenous, arranged in terminal dichotomous cymose clusters. Flowers small, actinomorphic, epigynous, purple to dull pink, each cluster supported by a rigid ovate leaf like bract, inner bracts leafy, distinct, pale green, cuneate below; pappus bristly, hairy. Flowering and fruiting season is August to December^{[2],[3],[4]}

Vernacular names

respiratory system, heart disease, bleeding problems fever, and wound healing.^[1]



Figure 2 Flower of *E.scaber*

Bengali: Hasti Pad; English: Prickly leaved elephant's foot; Hindi: Adhomukha, Bantambakhu, Gobhi; Kannada: Aane kaalu Gida, Hasti Pada; Konkani: Hakkarik; Malayalam: Koonjirikka, Ottaveran, Thomunji, Aanayadiyan, Aanayadi, Aanachuvadi, Marathi: Hastipata, Pathari, Oriya: Mayurachula; Sanskrit: Prastarini, Gojihva or Gojivha, Kharaparnini, Adhapata; Tamil: Yanai cuvati; Telugu: Eddupattu; Urdu: Gobhi.^[5]

In ayurvedic materia medica its properties have been described as; *Rasa- Kashya-Tikta, Guna- Laghu, Virya- Sheeta, Vipaka- Madhura, Dosha Shamak- Kapha- Vata Shamak, Karma- Grahi, Hridya, Indications: - Prameha, Kasa, Vrana, Jvara.*^[6]

Chemical constituents in *E.Scaber* ^{[7][8][9][10]}

The major chemical constituents present in *Elephantopus scaber* are

- a) Sesquiterpene lactones- Deoxyelephantopin, Isodeoxyelephantopin, Scabertopin, Isoscabertopin, Scabertopinol, 17,19- dihydrodeoxyelephantopin, Iso-17,19-dihydrodeoxyelephantopin, 11,13 dihydrodeoxyelephantopin, Molephantinin, Elscaberin, Elemanolide, Deacylcyanopicrin, Glucozaluzanin-C, Deacylcyanopicrin 3B-glucopyranoside crepiside E.
- b) Phenolic compounds 3,4-dihydroxy benzaldehyde, p-coumaric acid, vanillic acid, syringic acid, isovanillic acid, p-hydroxybenzoic acid, ferulic acid, 3-methoxy-4-hydroxyl cinnamic aldehyde, tricin, Oglucuronide 6"-methyl ester and luteolin-4-O-B-D syringic acid, E-3-(3-ethoxy-4-hydroxyphenyl) acrylic glucoside were identified along with three polyphenols acid, 2-hydroxybenzoate acid were purified from the trans-p-coumaric acid, methyl trans-cafeate, trans-cafeic ethanol fraction of the plant, flavonoid glycoside.
- c) Triterpenoids and steroids - Friedelin Epifriedelinol Lupeol, Betulinic acid 30-Hydroxylupeol LupeolAcetate, UrsolicAcid ursane-12 ene-3B-heptadecanoate

Stigmasterol, Stigmasterol-3-O-B-D-glucoside B-sitosterol, Daucosterol, 2,6,23-trienolide.

MATERIAL AND METHODS

Nighantu and all available classical literature were reviewed. Additionally, many data have been gathered that accessible on PubMed, Medline, Google Scholar, AYUSH Research Portal and numerous online journals.

DISCUSSION

Around 30 species of the herb *E. scaber* exist in the world, with *E. scaber* and *E. tomentosus* being the two species that are most widely distributed. In India's tribal communities, this plant is traditionally used as medicine to treat rheumatism, diarrhoea, gout, eczema, gum infections, toothaches, spider and snake bites. The extracts or compounds from *E. scaber* have been shown to have antibiosis, antiviral, and cytotoxicity actions in previous bioactivity studies. Particularly, the hepatoprotective and anti-inflammatory properties of sesquiterpene lactones have been studied.

The following properties have been discovered based on the data gathered and reviewed.

a) Anti-microbial activity

E. scaber is an herb with desirable antimicrobial activity. The methanolic leaf extract of

E. scaber confirmed vast antibacterial actions towards *S aureus*, *E coli*, *P aeruginosa*, *B*

subtilis and *P. vulgaris*. Ethyl acetate extract of the plant confirmed inhibitory impact at 4 mg/ml except in *Klebsiella pneumonia* where it confirmed ~75% inhibition. At 2 mg/ml 50% inhibition were shown in all of the cultures. The acetone fraction of *E. scaber* proved remarkable antibacterial impact towards methicillin resistant *Staphylococcus aureus* and methicillin resistant *Staphylococcus aureus*. Methanolic extract of *E. scaber* was investigated for its antibacterial activity against *Staphylococcus aureus*, *Escherichia coli*, *Bacillus subtilis*, *Pseudomonas aeruginosa*, *Proteus vulgaris* at 100 µg/disc by using disc diffusion method. The extract showed significant anti-bacterial activity and were compared to chloramphenicol (30 µg/disc)^[11], also it showed presence of flavonoids known as nature's organic reaction modifiers due to their inherent properties to regulate the body's response to allergen, virus and carcinogens. They display anti-allergic, anti-inflammatory, anti-microbial and anti-cancers actions. Tannins are known to possess general antimicrobial and antioxidant activities. Other compounds like saponins have anti-fungal properties. Phenolic phytochemicals have antioxidative, antidiabetic, anticarcinogenic, antimicrobial, antiallergic, antimutagenic and anti-inflammatory^[12].

b) Anti-inflammatory activity

The hydroalcoholic extract of aerial part of *E. scaber* was studied for the in vivo anti-inflammatory action in albino rats and confirmed that desirable dose of the compound is powerful in inhibiting carrageenan caused oedema. A study to analyse protective mechanism of *E. scaber* using lipopolysaccharide (LPS) caused inflammation of BV-2 microglial cells and acute liver injury in Sprague-Dawley rats. *E. scaber* decreased LPS caused nitric oxide (NO), interleukin (IL)-1, IL-6, reactive oxygen species and prostaglandin (PG) manufacturing in BV-2 cells. Further it reduces serum aspartate aminotransferase. Ethyl acetate fraction from the leaves showed anti-neuroinflammatory impact in lipopolysaccharide (LPS)-caused microglia cells (BV-2) through blocking nuclear factor B (NF-κB). Hence *Elephantopus* proven as anti-inflammatory and hepatoprotective herbal drug.^{[13][14]}

c) Hepatoprotective activity

E. scaber studied for its hepatoprotective impact in mice, and found to have a hepatoprotective impact. The mechanism of *E. scaber* safety entails an antioxidant impact and inhibition of p38 MAP kinase and COX-2 expressions in LPS-burdened acute hepatic damage in rats. One of the comparative studies, carried out between *E. scaber* and *Phyllanthus niruri* on ethanol-induced liver

damage in mice. In this total phenolic and total flavonoid content *E. scaber* ethanol extract was analysed. Accelerating serum biochemical profiles (including AST, ALT, ALP, triglyceride, and total bilirubin) associated with fat drop and necrotic body in the liver section were observed in the mice treated with ethanol. Low concentration of *E. scaber* helps to reduce serum biochemical profiles and the fat accumulation in the liver. Whereas high concentration of *E. scaber* and positive control *P. niruri* were proven revert the liver damage.^[15]

d) Anti -cancerous activity

Lupeol is a triterpenoid, found in maximum of the medicinally powerful plant life that possess anticancer potentials extracted from leaves of *Elephantopus scaber* L. This compound effectively downregulated Bcl-2 and Bcl-xL protein expressions, which initiate the induction of MCF-7 that causes apoptosis. Hence it possesses a good cytotoxic property.^[16]

Effects of *E. Scaber* was also studied on Osteosarcoma which is a bone malignancy disorder. And found that Deoxyelephantopin (DET), present in *Elephantopus scaber*, has been proven to have an anti-tumor impact. Also, DET causes apoptosis in osteosarcoma cells via ROS generation, mitochondrial disorder and caspase activation^[17]. In another

study anticancer effects of ES in human epithelial cancer cells was studied and found that the enriched fraction of ES impart cytotoxic effects, triggered apoptosis, induced genotoxicity, and inhibits MDR transporters in human epithelial cancer cells.^[18]

One more study carried on *E.scaber* showed that Deoxyelephantopin (DOE) has been shown to exhibit antitumor activities against uterine leiomyoma (UL) .In this study DOE shown to inhibits growth of UL cells via cell cycle arrest at G2/M phase, induces ROS-dependent caspase-3-mediated mitochondrial intrinsic apoptotic pathway and down-regulation of oncogenic lncRNA in UL cells^[19]. Further in another study its showed that DET induced apoptosis and cell cycle arrest in HCT116 colorectal carcinoma, suggest that DET is potential anticancer agent for colorectal carcinoma.^[20]

e) Anti-asthmatic activity

Ethanol extract of *Elephantopus scaber* leaves evaluated for its anti-histaminic action on histamine and acetylcholine-triggered bronchospasm, mast cell degranulation and histamine triggered constriction on guinea pig tracheal chain at unique dose levels and found to be effective.^[21]

f) Nephroprotective Activity

The nephroprotective impact of *Elephantopus scaber* will be due to its flavonoid content

material and the inherent antioxidant property.^[22]

g) Wound healing activity

Deoxyelephantopin, due to the presence of energetic moiety, α methylene γ lactone confirmed significant effect towards wound healing activity by increasing cellular proliferation, Formation of granulation tissue, synthesis of collagen and increase in the rate of wound contraction.^{[23],[24]}

h) Lipolytic activity

The hexane extract of *E.scaber* produced decreases in level of cholesterol (TC), Triacylglycerol (TG), low-density lipoprotein-cholesterol (LDL cholesterol), with an increase in High-density lipoprotein-cholesterol (HDL) showed to have a hypolipidemic ability.^[25]

i) Balances the hormonal level

Elephantopus scaber with *Sauropus androgynus* in combination acts on circulating follicle-stimulating hormone (FSH) and luteinizing hormone (LH) levels and erythropoiesis changes in *E. coli*-infected pregnant mice.^[26]

CONCLUSION

In the traditional medical system, *E.Scaber* is one of the most often prescribed medications for respiratory issues. The aforementioned information leads to the conclusion that this herb has good potential for treating a number of diseases. Therefore, future potential is to

use it in the various forms that are already available for the diseases described and to authenticate the data to produce additional, reliable proof.

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